It’s another

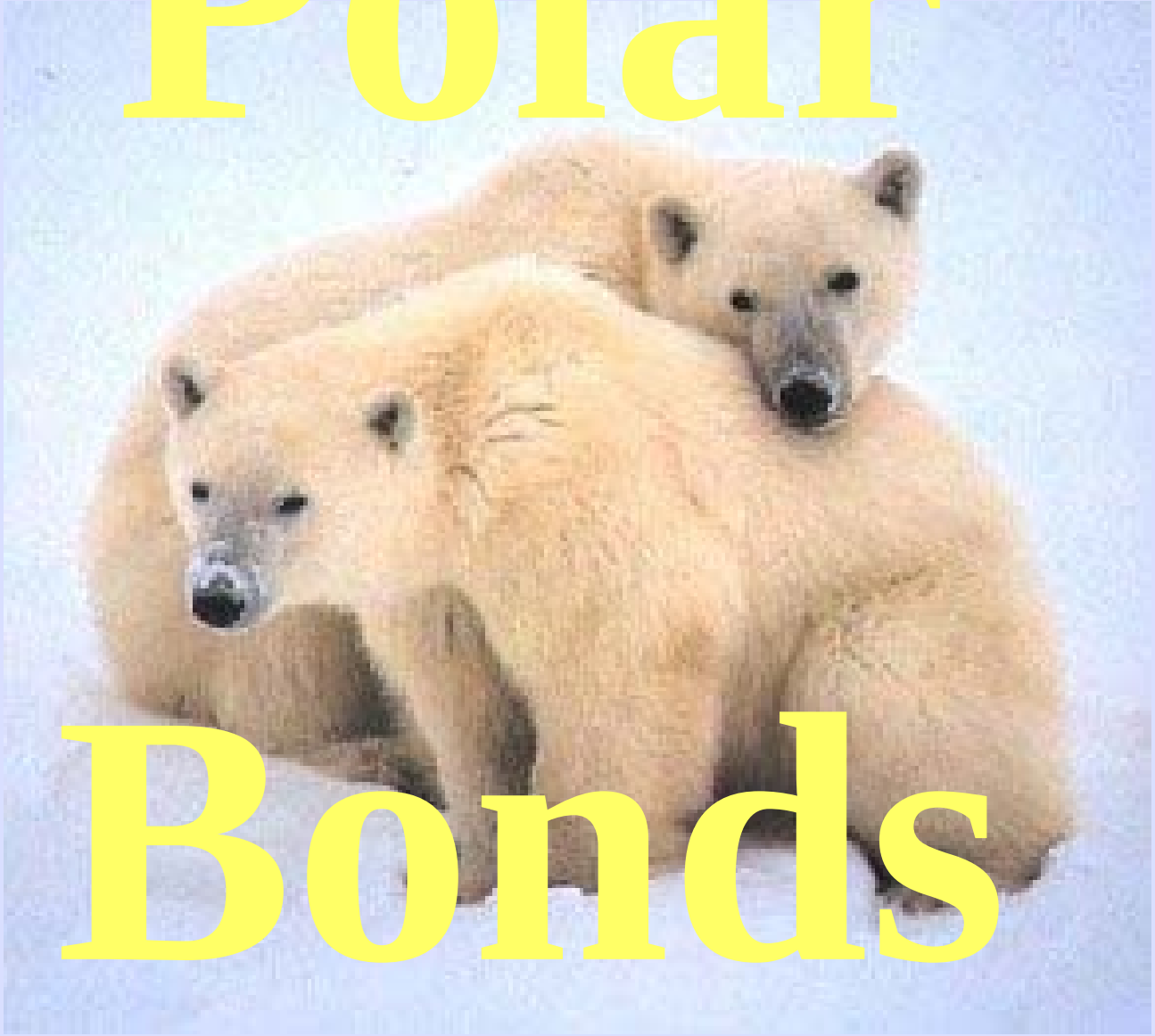
WEINERPOINT

PRESENTATION

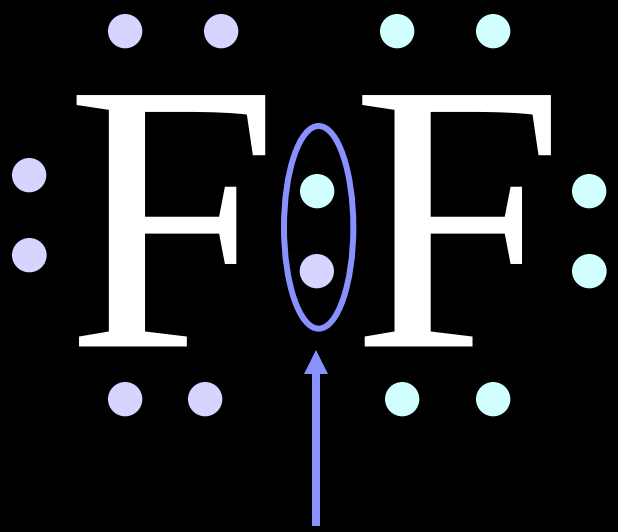
BONDING

PART III

Polar Bonds

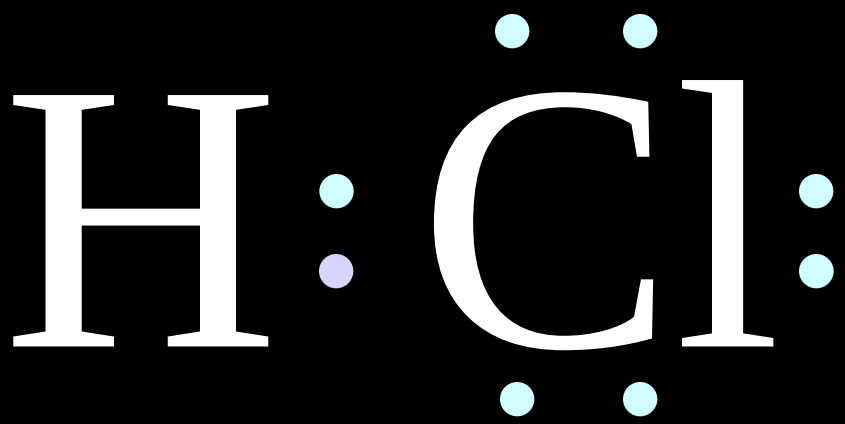


We know a
COVALENT bond
comes from sharing the
bonding pair of electrons

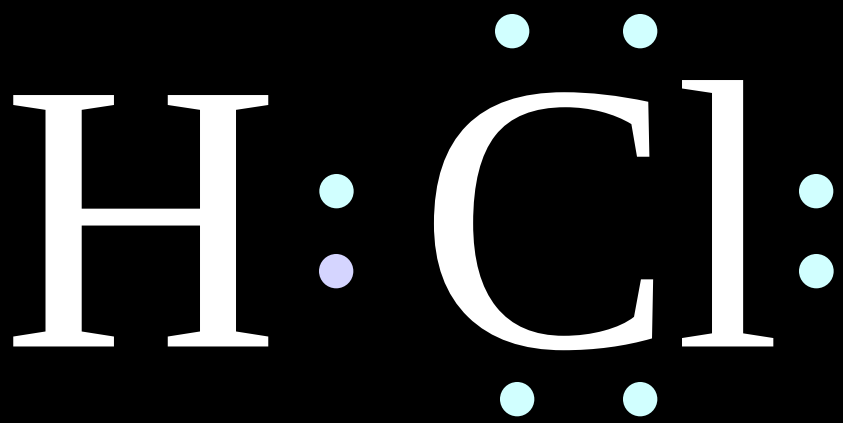

Shared pair
(bonding pair)

The nucleus of each atom pulls on the bonding pair.

Both atoms have equal pull,
so the bonding pair is shared equally.



If two *different* atoms share a bond,
one will pull more strongly
on the bonding electrons.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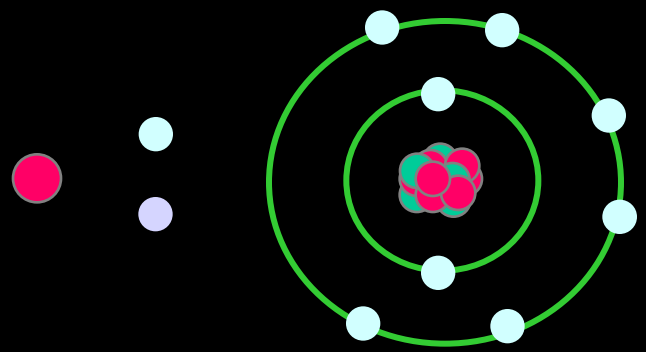

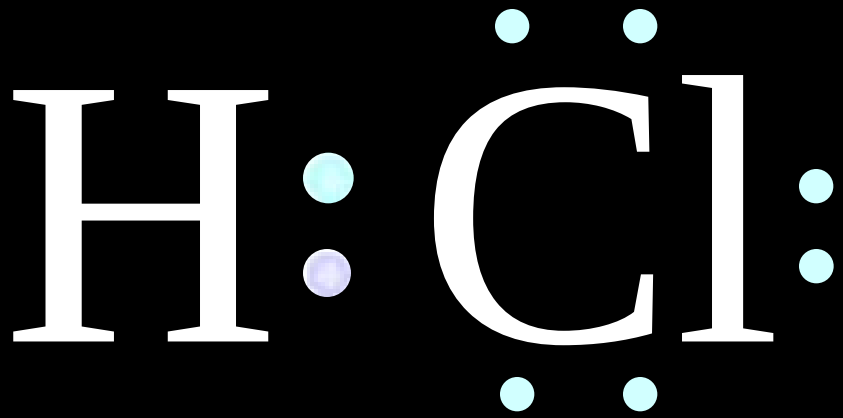
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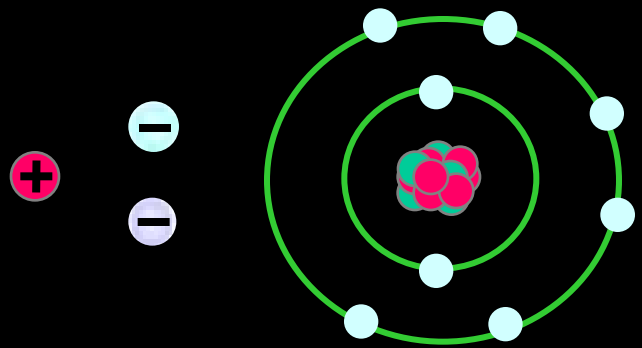

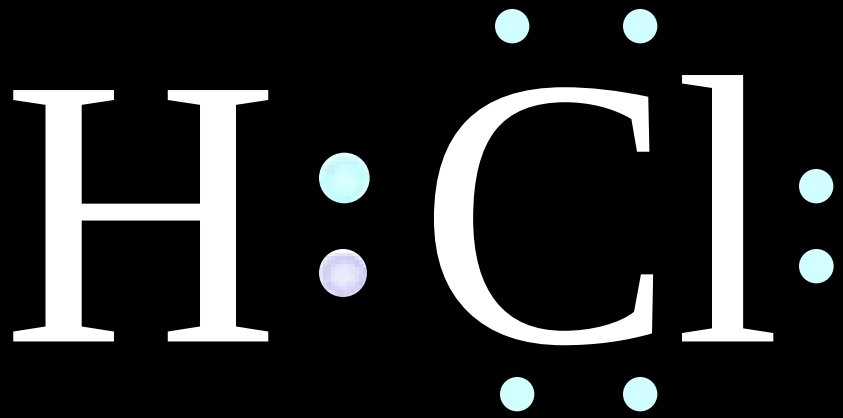
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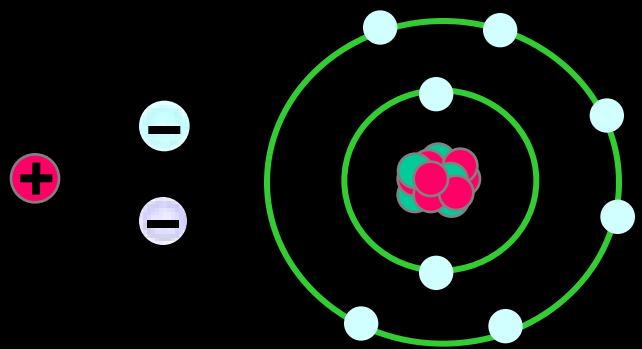

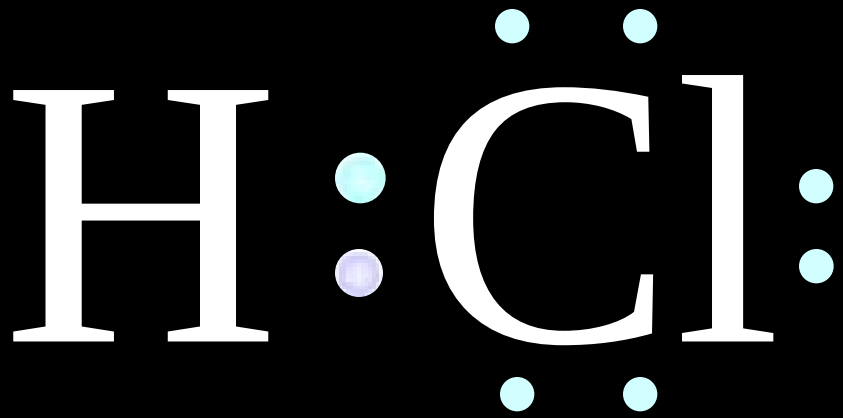
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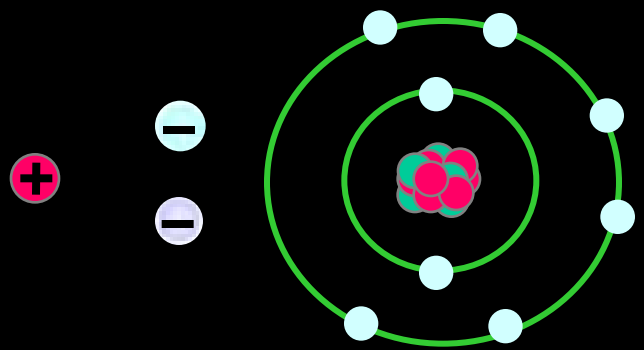

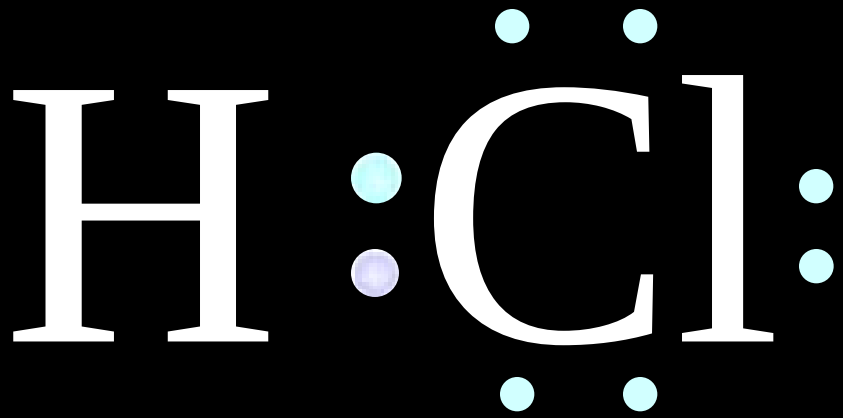
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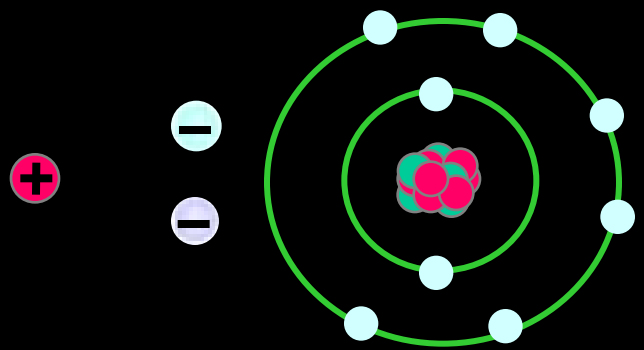


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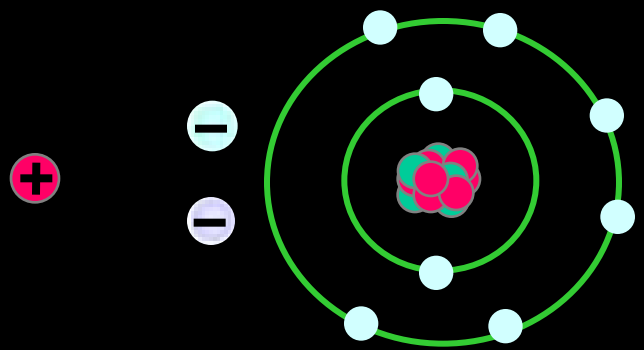

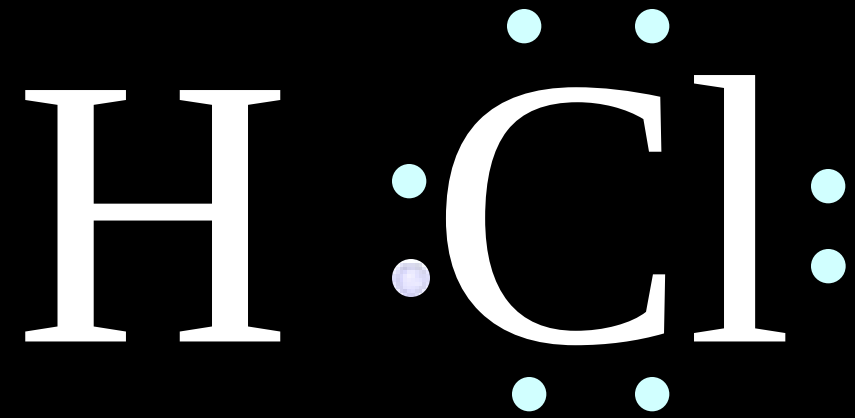
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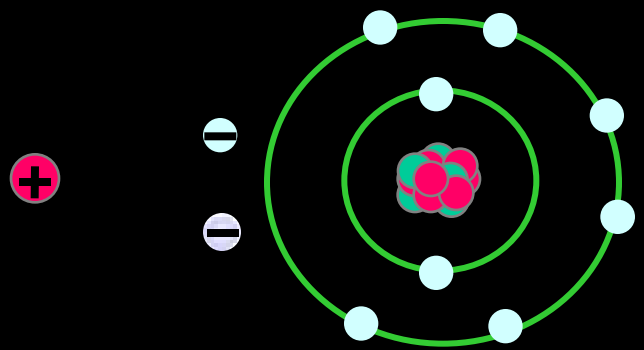

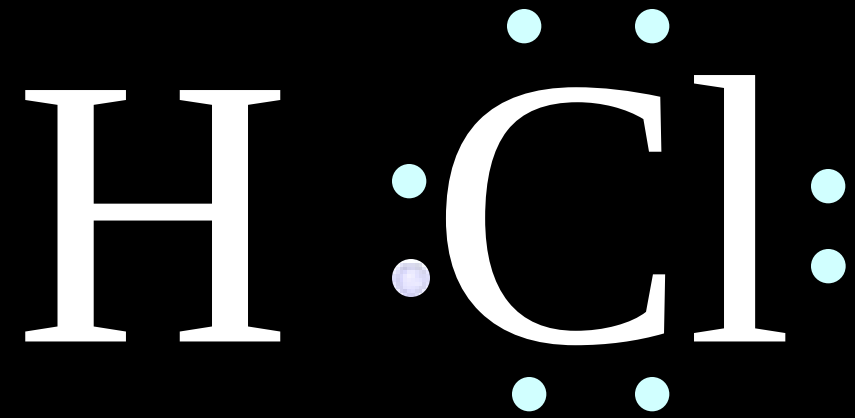
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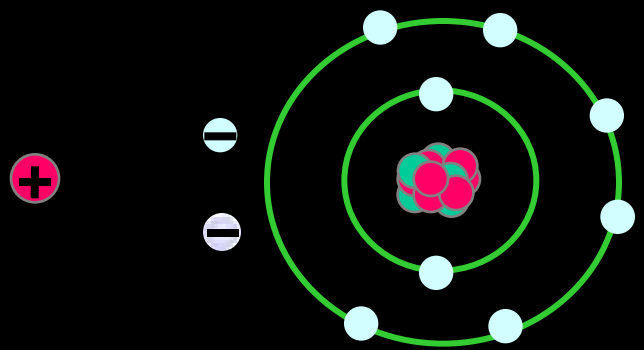
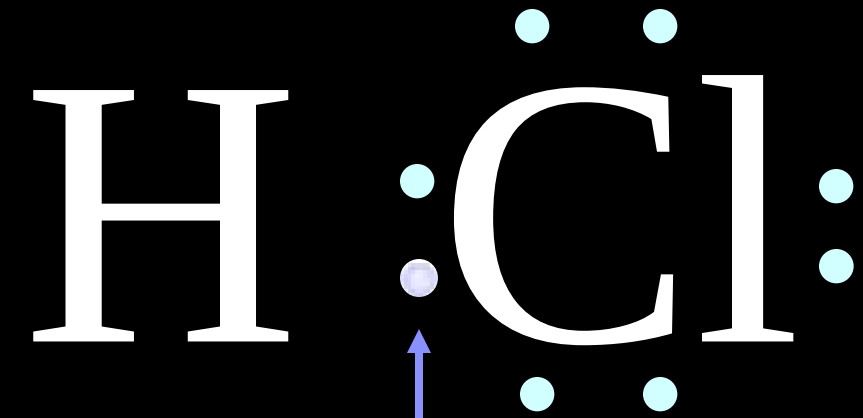
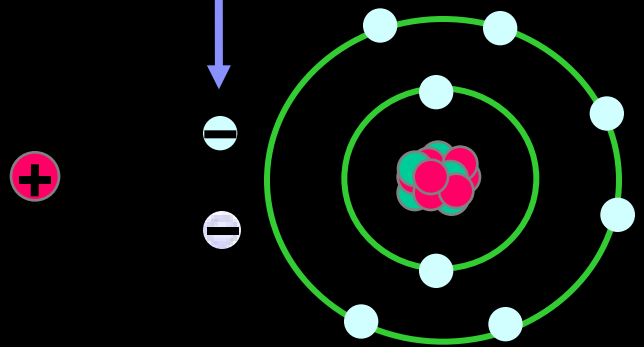
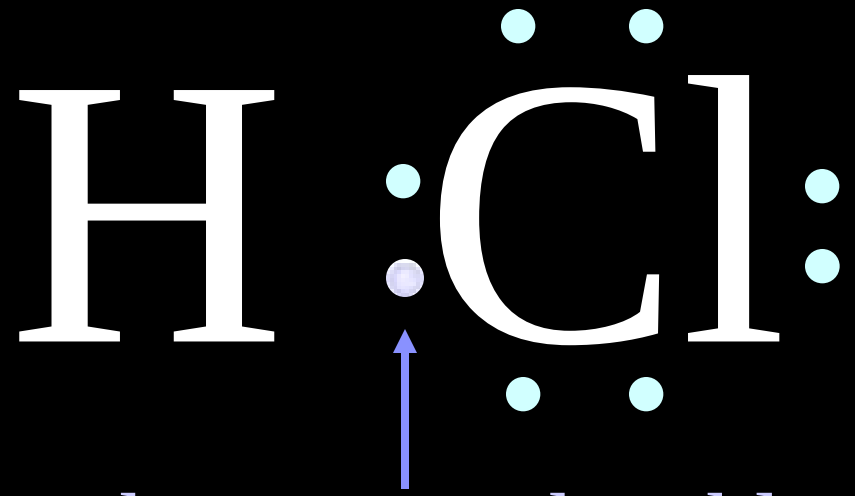




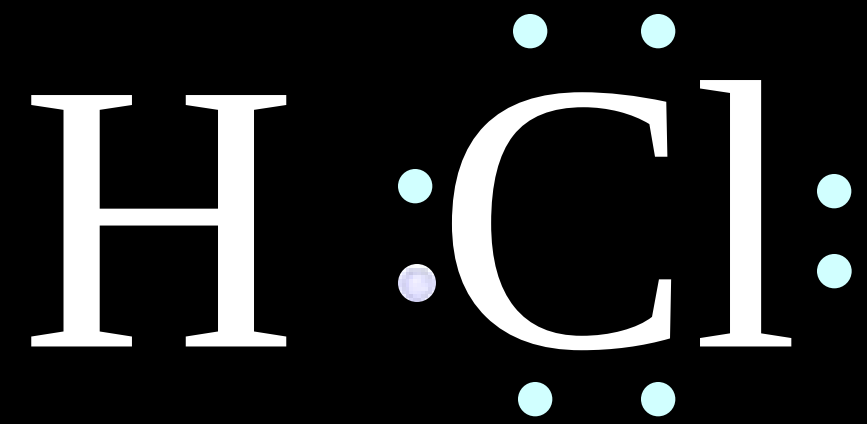
The bonding electrons carry negative charge.





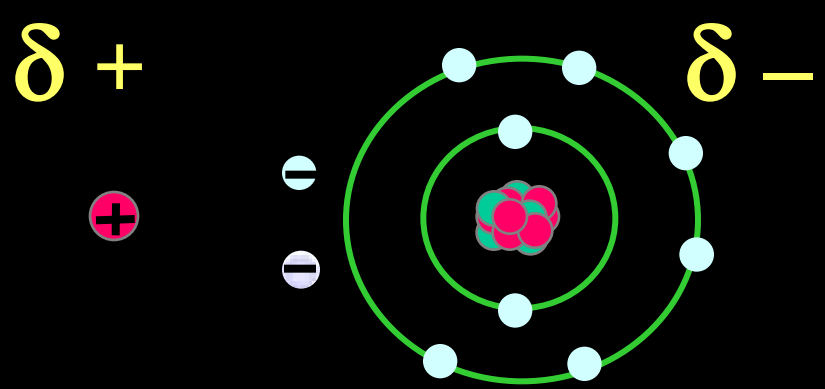
The closer they get to the chlorine atom,
the more negative it gets.
The farther they get from the hydrogen,
the more positive it gets.

But the charge is only partial. Hydrogen has not *lost* the electrons as in the formation of an ion.



There is an unequal sharing of electrons.

The *partial* charge is denoted by a + or – and the Greek letter delta, δ



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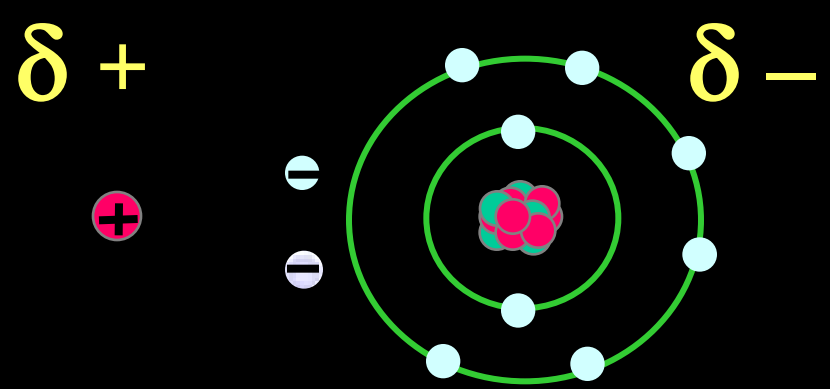
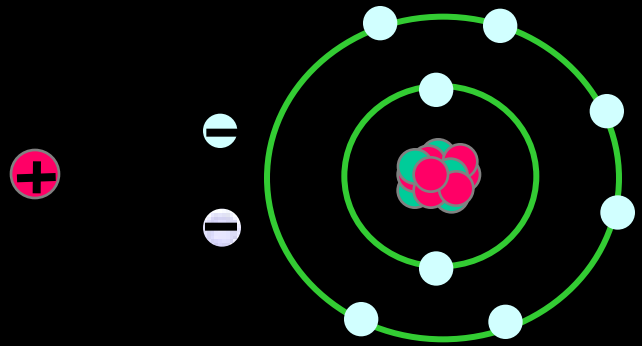

δ +
δ –

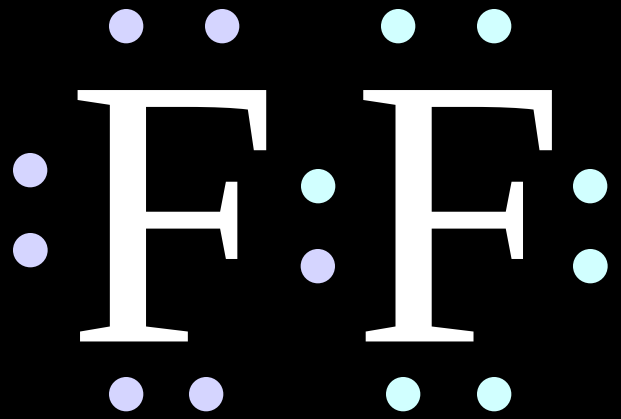
A polar **bond** is a bond in which the bonding electron pair is shared unequally.

A polar **molecule** is a molecule with regions of partial negative ($\delta -$) and partial positive ($\delta +$) charge.



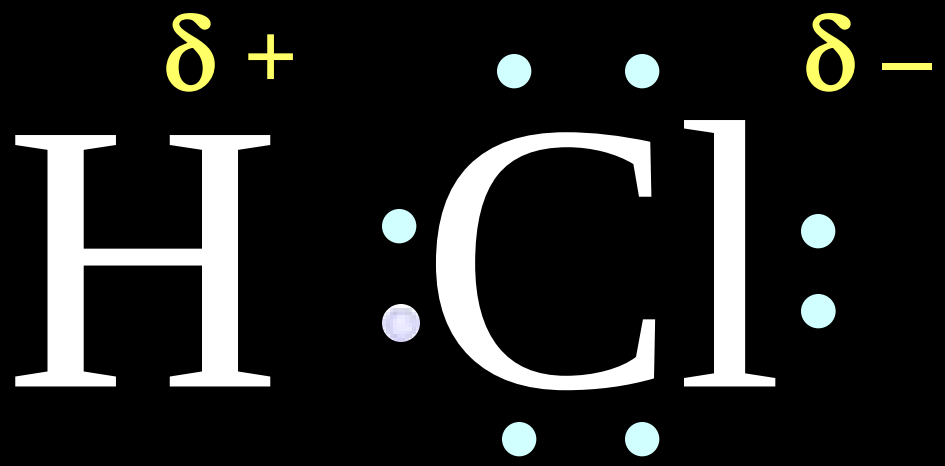
The degree of sharing (equal to unequal) is determined by the electronegativity difference between the two atoms.

What is electronegativity??



Two atoms of equal electronegativity will share the bond equally

Two atoms with a small difference in electronegativity will share unequally, resulting in partial charge.



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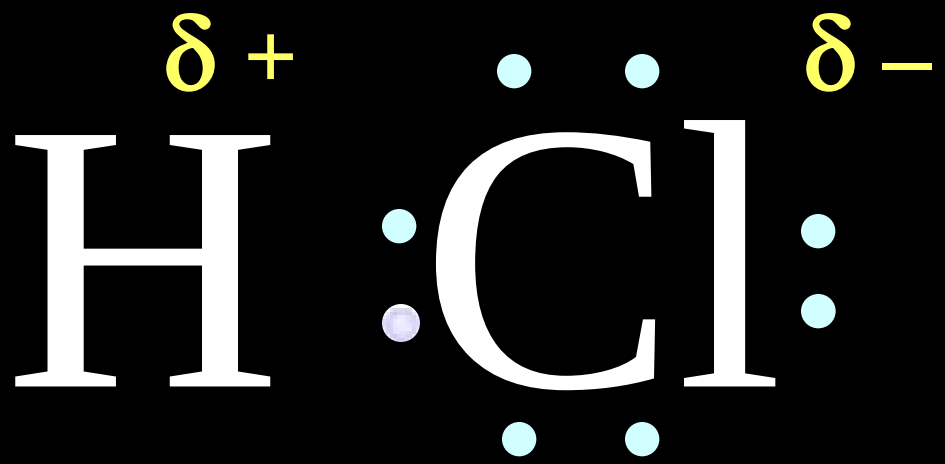
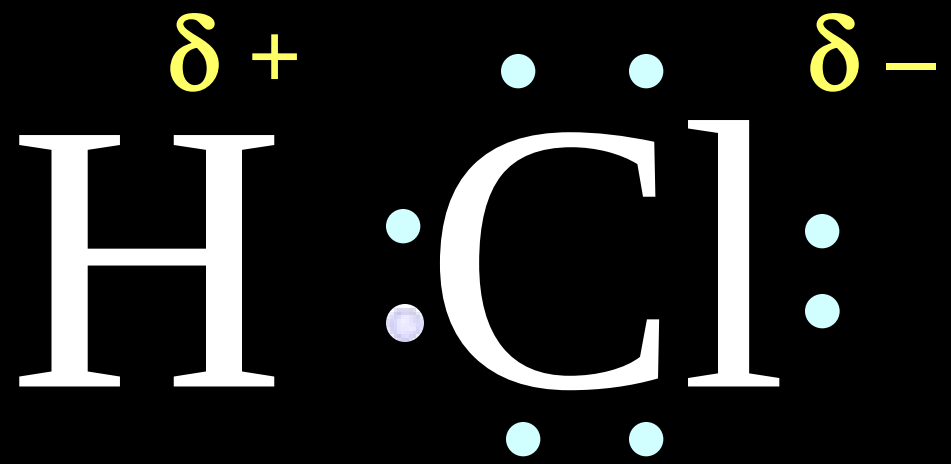
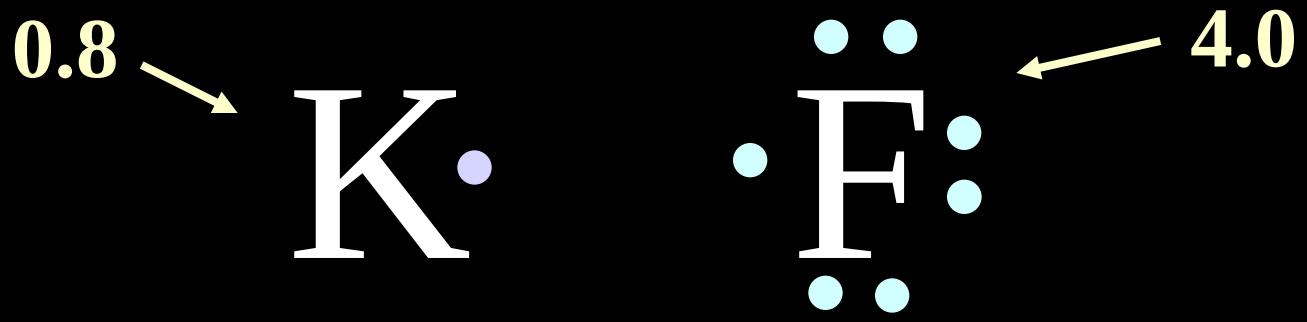


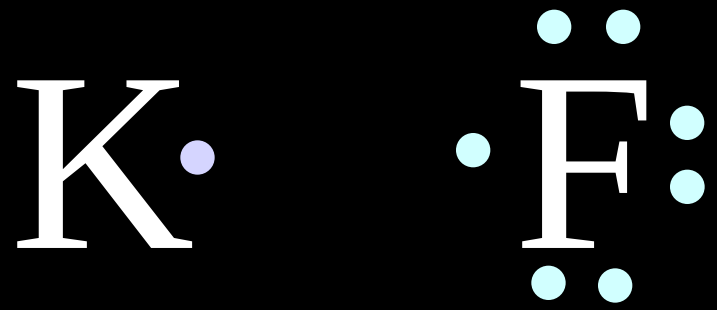
This is a polar bond:
The bonding pair is, on average,
closer to one atom.

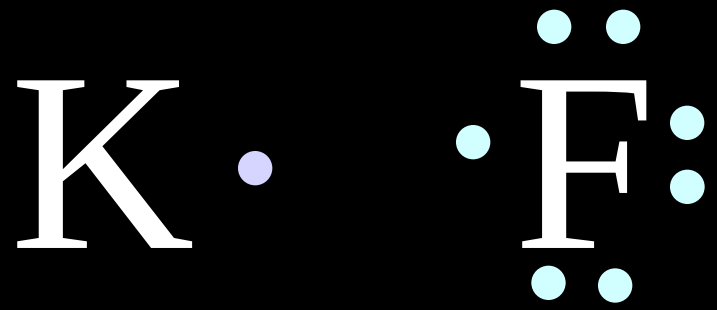


Is a polar bond a covalent bond?



Two atoms with a large difference in electronegativity will result in a loss of an electron,
resulting in a full charge.


K
F


K
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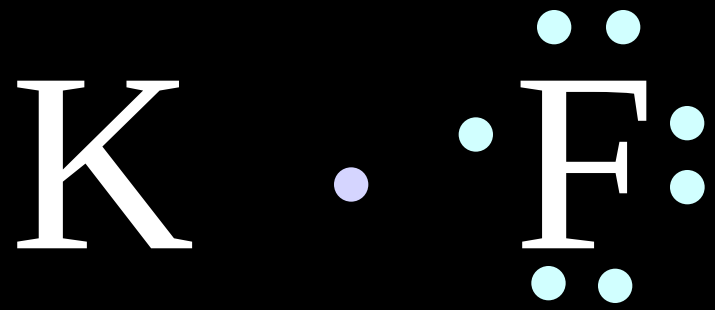
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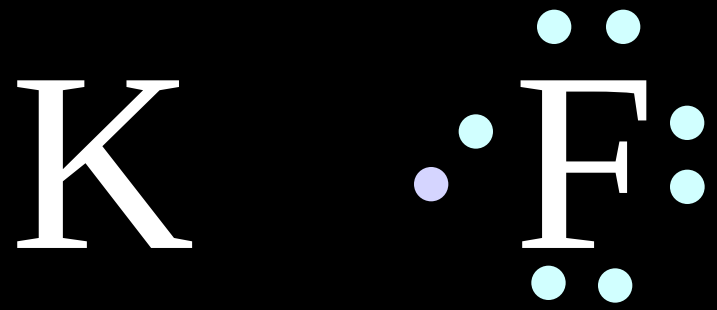
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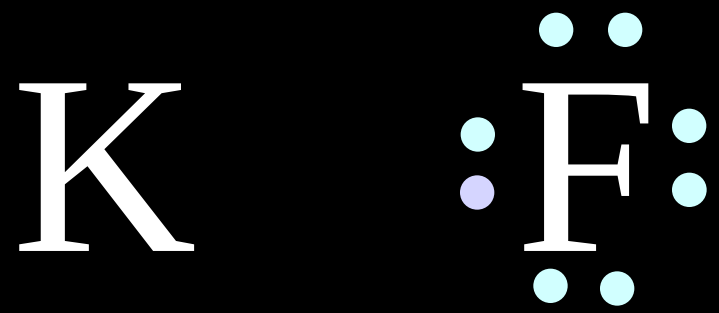
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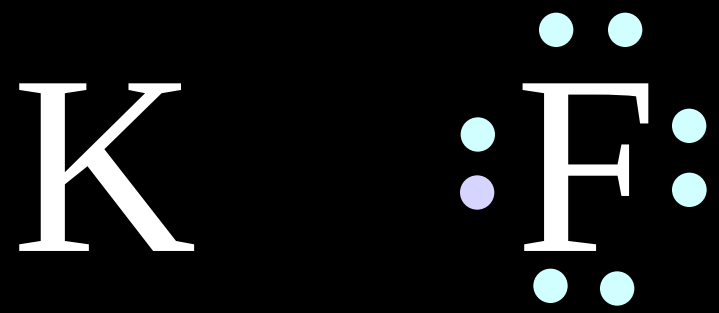
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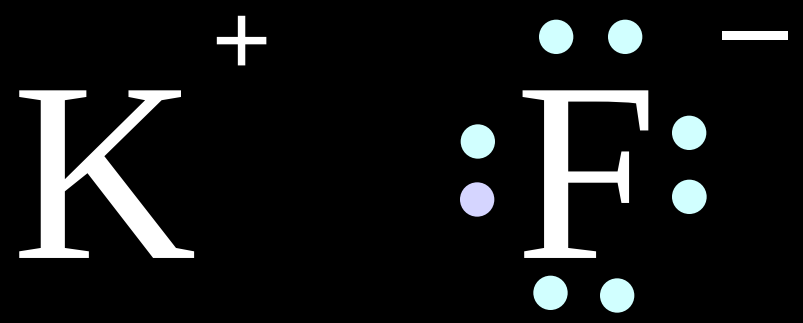
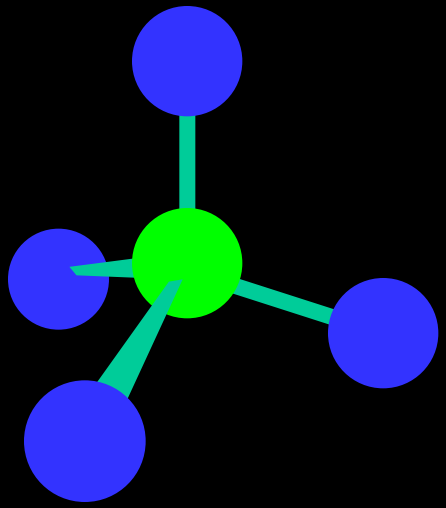


positive ion negative ion

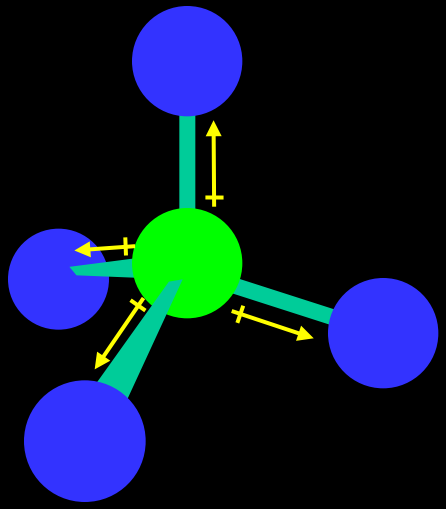
A polar bond in a molecule may make the entire molecule polar, with one end slightly positive and the other end slightly negative.

Hydrogen chloride is an example of a polar molecule.

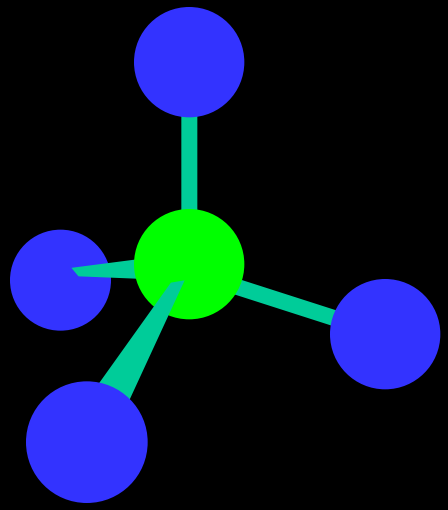
The ***SHAPE*** of the molecule determines whether its polar bonds make the molecule polar



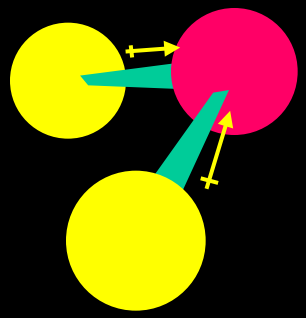
In CF_4 the fluorines are symmetrically arranged around the carbon.



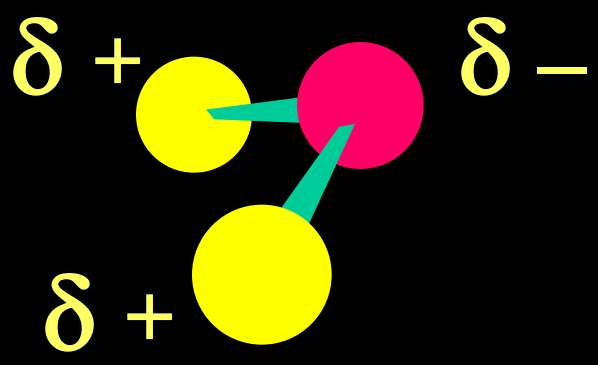
The fluorines all pull on the valence electrons in opposite directions, effectively cancelling out the polarity of the bonds



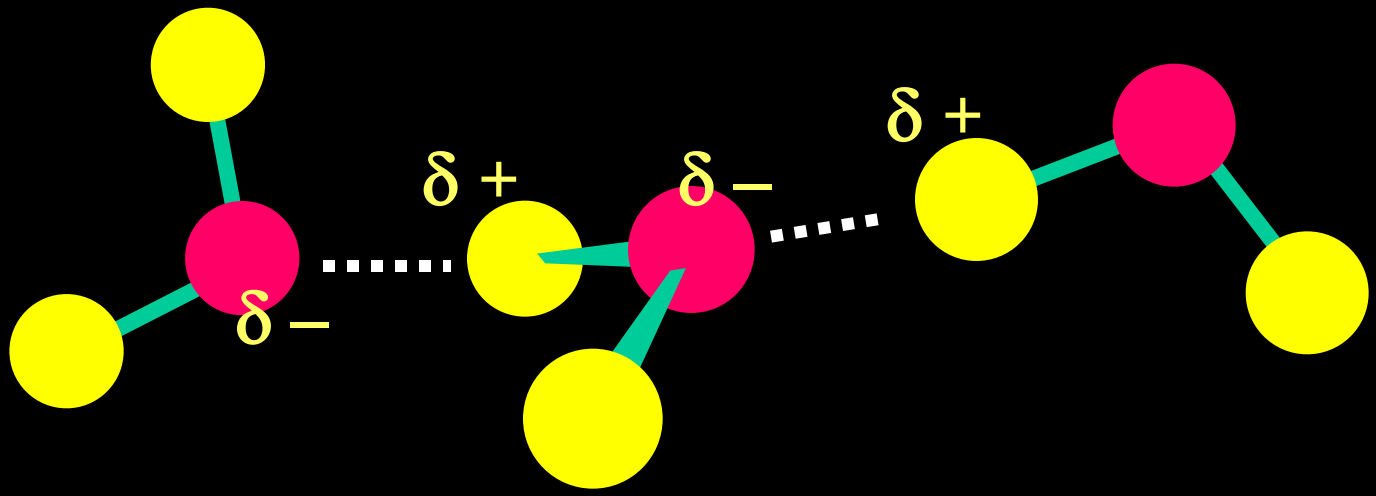
CF_4 has four polar bonds
but it is a non-polar molecule:
There is no partial charge
on the molecule.



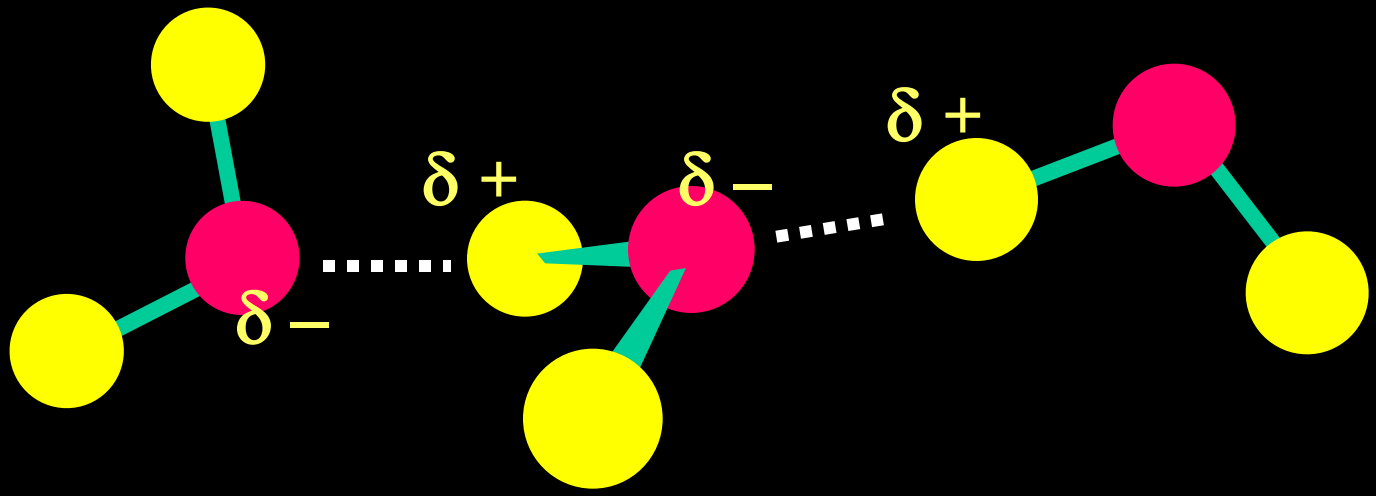
The two hydrogens of water are *not* symmetrically positioned around the oxygen.



The O-H polarities do not cancel,
and the molecule carries a partial charge.



Water is a liquid instead of a gas because the partial positives and negatives attract each other.



This attraction holds the molecules together, forming a liquid rather than the spread out molecules of a gas.